Canada: School of Search and Rescue Observation

May 10-21, 2004

Introduction

The BLM smokejumper program was invited to observe a portion of the Canadian Forces Search and Rescue jump training. Objectives of the observation were to examine their training techniques, equipment, and to establish contacts with their instructor cadre. Bill Cramer, Alaska Smokejumper Training Supervisor, and Marty Adell, Boise Smokejumper Asst. Loft Manager, observed the training from May 10 through May 20, 2004.

Background

Initial contact with members of the Canadian Forces School of Search and Rescue occurred in 2002 at the Parachute Industry Association Symposium. The similarities in mission, operating environments, organizational size, and their recent conversion to a new ram-air parachute system provided a strong incentive for the BLM to establish closer contacts.

Mission

Canadian Forces Search and Rescue Technicians (SAR-Techs) are members of the Canadian Air Force and are responsible for emergency response to both military and civilian land and sea incidents. Unlike their counterparts in the US military, SAR-Techs do not have a mandate to provide services in overseas combat situations.

Organization

There are approximately 130 SAR-Techs spread amongst five primary SAR squadrons, the Canadian Forces School of Search and Rescue (CFSSR), and in various administrative positions. The CFSSR provides the initial training to new personnel entering the trade in a year long course that includes medical training to the paramedic level, diving, mountain climbing, parachuting, and helicopter operations.

Facilities

The CFSSR is located adjacent to Comox, British Columbia on Vancouver Island.
The school facilities are very well equipped to provide an excellent training environment. Procedural training is conducted in classrooms and a large multipurpose room that is equipped with 4 hanging harnesses. The hanging harnesses are very versatile and are utilized to teach exit techniques, post opening checks, malfunction procedures, and letdowns.

Use of a jump tower was discontinued when the school was moved to Comox from Edmonton in the mid-1990s. Instructors reported no negative consequences from this change. Aircraft procedures are practiced in the actual aircraft but the school is in the process of obtaining a mock-up.

Parachute Equipment

The SAR-Techs replaced their original ram-air system in 2001. The original system, CSAR-4, was static line deployed, utilized a 7-cell, 370 sq ft. main, and a round reserve. Prior to the early 1990s, round canopies were used.
The new system, CSAR-7, can be configured for either freefall or static-line deployment. It utilizes a Military Javelin harness container, Performance Design 305 sq ft. 9-cell main (Military Silhouette), and a Performance Design 335 sq ft. 7-cell reserve (Tactical Reserve).

The SAR-Techs are extremely satisfied with their new system compared to the old. Reported benefits include significantly lower malfunction rates, significantly higher overall quality, and longer canopy life. Overall, they are enthusiastic about the performance characteristics of the 9-cell although they needed to modify their jump techniques for use in confined areas.

SAR-PELS

The SAR-PELS is a large container that attaches to the front of the harness/container for the purpose of transporting equipment and personal gear. The volume capacity is approximately 3 times that of the BLM's personal gear bags (69 liters) and is designed to carry 25 to 60 lbs. The SAR-PELS empty weight is 12 lbs. It features a built in drogue parachute and release system.

The SAR-PELS allows the jumper three options for delivery:

- Landing with the SAR-PELS attached, (full retention)
- Landing with the SAR-PELS released to a tethered position
- Releasing the SAR-PELS from attached or tethered position and landing without the container.

Jump Configuration

The SAR-PELS is connected to the harness at 4 places. Each connection has a three-ring component. The lower attachments have adjustable snaps that allow the jumper to tighten or loosen the connections as needed.

The jumper's upper left attachment point has an "ejection system assembly" that provides the means for the jumper to completely separate from the SAR-PELS or to retain it in a tethered position.

The SAR-PELS features fastex buckles that allow the flexibility to attach mission specific items such as snowshoes, extra radios, ect.

Jumpers reported the SAR-PELS to be fairly comfortable to wear and did not believe that it negatively affected their exits or ability to access handles.

Full Retention

Landing with the SAR-PELS attached is advocated in training materials for jumps with confined areas, high wind conditions, and/or deep snow. Disadvantages cited include less visibility and the possibility of hindering PLFs.

Most of the instructors said they preferred this mode on operational jumps due to the added protection it provided and the guarantee of having their gear with them on landing.

Stand-up landings are standard but the SAR students were able to perform satisfactory PLFs with the SAR-PELS in full retention mode when needed.

Tethered Position

The tethered position is advocated in training materials for water entry and provides an improvement in visibility. Disadvantages included possible hang up in trees and the risk of a complete jettison.

The SAR-PELS is suspended from the jumper's upper left attachment point in the tethered position. While suspended the system is designed to be no longer than 144" from the bottom of the pack to the jumper's feet.

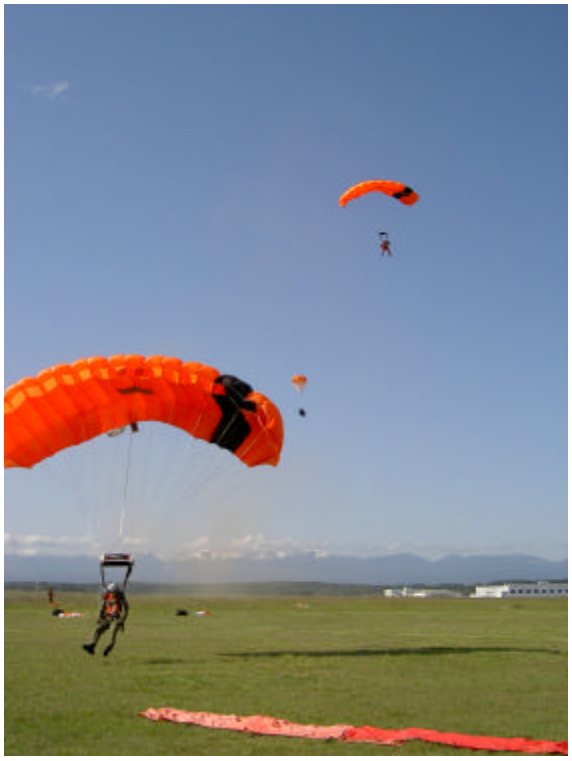
This mode was least preferred amongst the instructors.

Tethered and Full Release

Releasing the SAR-PELS from the harness gives the jumper a decrease in landing weight and more freedom of movement upon landing. Disadvantages include the possible loss or damage of equipment, increase in time to retrieve the bundle, and the risk of "bombing" other jumpers in the air or on the ground.

A number of flight strategies were advocated to minimize the disadvantages:

- Full release upwind of target at 500-1000' AGL, maneuver towards downwind past target, and land short of the SAR-PELS if other jumpers haven't released their bundles. Landing at the SAR-PELS is appropriate if all jumpers have released.
- Fly downwind of target and release bundle on final at jumper's discretion
- Fly downwind over the target at approximately 500' AGL and release prior to turning into the wind for landing
- Back towards target, release, and land.



The drogue slows the descent of the SAR-PELS to an approximate rate of 30' per second. Care in packing of the SAR-PELS would be required to prevent damage to items such as radios.

Aircraft

De Havilland Buffalo (CC-115) and C-130s are used as fixed wing platforms for both training and operational purposes. Jump operations can be performed utilizing either the rear ramp or the side door. The vast majority of jumps are performed off the rear ramp. Side door exits are taught in case a situation arose where the ramp was inoperable and may be a carryover from the time when they used Twin Otters. The school is considering using a contracted Twin Otter next year during the freefall portion in order to reduce costs and delays due to current aircraft availability issues.

Jump Training Progression

Students perform over 50 jumps prior to moving to the operational squadrons. Prior to the adoption of the CSAR-7, the jump training progressed in a manner that was similar to the BLM albeit with roughly double the numbers of jumps. Jumpspots become more difficult and closer to what might be seen operationally as the training progresses. The CSAR-7 has the capability to be configured for freefall jumps and the SAR-TECH school began utilizing this mode during student training. This year's course followed the following progression.

- The initial 7 jumps were performed in static line configuration.
- The following 33 jumps were performed in the freefall configuration utilizing ripcord activation for the first few freefall jumps and bottom-of-container (BOC) activation for the remainder.
- The remaining jumps are performed using the static line configuration with the introduction of the bush suits, SAR-PELS, confined areas, night jumps, and water jumps.

Currently, operational jumps are performed only in the static line configuration. The ease of freefall configuration rigging allowed the school to perform significantly more jumps in a shorter time period than the static line configuration allows. The vast majority of instructors felt this progression was superior to performing all static line jumps. It is somewhat likely that the freefall configuration will be approved in the future for operational jumps so the school is preparing their instructors and students for this possibility.

Other advantages of the freefall configuration cited included:

- Increased compatibility with foreign units
- Increased aircraft flexibility
- Improved morale

AAD Utilization

The SAR-Techs utilize military Cypress AADs on all jumps at or higher than 2000' AGL. The units are turned off when jumping at lower altitudes. One dual deployment occurred this spring when a jumper deployed his main canopy too low on a freefall jump.

Equipment Checks

Procedures are similar to those used by the BLM with a primary check occurring in the aircraft for operational missions. The primary check is performed on the ground for training jumps. A secondary check occurs in the aircraft on all jumps.

Stick size

Operationally, aircraft typically carry only two jumpers on their aircraft and utilize 2 jumper sticks with the team leader jumping first. 4 jumper sticks are commonly used during training to minimize the necessary number of passes but stick size is dependent on the jump spot size and wind conditions.

Jump Altitude

Jump altitudes vary depending on ceiling limitations and wind conditions. The normal jump altitude is 3000' AGL but operational jumps are allowed as low as 1200' AGL. The lowest allowed altitude for training jumps is 1500' AGL.

Exit Techniques

A cannonball type exit is taught to the students although a small number of instructors preferred a modified sit style of exit. The cannonball exit is relatively easy to execute but a fair number of the jumpers had their legs rotate up which resulted in a less than optimal body position on deployment. Jumper rotation immediately after exit was uncommon for ramp exits.

Canopy Deployments and Malfunctions

The SAR-Techs are happy with the deployment characteristics compared to their previous system. Openings are relatively soft compared to their previous system and their reports are consistent with the BLM jumper's experience utilizing this system in the spring of 2004.

Video footage of the early stages of the deployment sequence shows some potential problems with asymmetrical riser lift off and the relative position of the risers to the head and neck. On one lift of 14, 35% of the jumpers had an unequal deployment of their risers with the left riser hesitating in all cases. The relative position of the static line cable to the jumper's exit position on the ramp may be the cause. Poor body position with the legs downwind relative to the upper body often resulted in a fair amount of contact between the risers and the jumper's head and neck.
The SARs don't view their twist frequency as problematic. Observed twist frequency on the rear ramp jumps was approximately 15% with some being twisted at least 3X. Some instructors advised that twists could be prevented or minimized if the jumper spread the risers in the latter portion of the deployment process. Further examination of video taken during the observation could determine if significant differences exist between the instructor and student jumpers. Twist frequency is certainly higher than the BLM's drogue system. To date, the SARs have not experienced a canopy collision due to twists but they have had one jumper cutaway and deploy his main due to extensive twists.
Attempts to get exact reliability numbers for malfunctions requiring reserve activation were not successful but reliability rates between side door and ramp exits in the static line configuration may not correlate. The SAR-Techs have experienced at least two malfunctions when operating in the static line configuration; the aforementioned twist malfunction and one inadvertent deployment of the reserve during exit. The latter incident also resulted in a canopy collision with the following jumper.

Malfunction Procedures

Training or execution of procedures was not observed. Review of training materials indicated that corrective actions are similar to current BLM procedures. Procedures vary depending on jump altitude. Jumpers are taught to immediately initiate emergency procedures without taking corrective actions on low level jumps.

Jump Techniques

SAR-TECH jump techniques are fairly similar to the BLM's in open areas. Standard patterns were used with slight modification when the SAR-PELS was going to be released. Techniques change in smaller jumpspots due to the nature of their nine-cell main canopies. "Sash shays" are used to bleed off altitude instead of sinks or stalls. Fairly low level turns were used to minimize the distance covered on final. The float characteristics of the nine cells caused a number of students to overshoot when the class progressed from open fields to large (2-3 acre) "confined" jumpspots. The full glide setting for final and flare was used almost exclusively during the jumps. The rationale seemed to be that it provided the potential for the softest landing. Predictably, it also provided the speed for a fair number of high speed landings. A few jumpers used planning to increase the steepness of their final approach with mixed results.
Text materials stated that this canopy is most stable at the full run setting but a number of instructors had bad experiences (partial canopy collapse) that caused them to disagree with this and advocated using a lower brake setting such as 1/8 or ¼.
Overall accuracy of the students appeared to be lower than BLM ram-air rookies but our observations occurred during their introduction to the SAR-PELS and accuracy was a

secondary consideration. Instructor accuracy was on par with that of our most experienced and competent jumpers.

Landings

PLFs are optional and are left at the jumper's discretion to perform. The large majority of observed landings were stand-ups although a number were forced and landing surfaces were all level grass. The few PLFs witnessed with the SAR-PELS attached or in tether mode were not textbook but effective.

Letdowns

The SAR-Techs utilize a sky genie rappel device with 250' of rope. The concept is much better than the BLM's current technique of threading and tying off. The SAR-TECH procedure is simpler and faster but the sky genie and type of rope is impractical for smokejumping operations due to its bulk and weight. A new device that is somewhat smaller is in the process of being approved and but both bulk and weight remain a significant issue for smokejumper operations.

Recommendations

The BLM should make efforts to continue a working relationship with the CFSSAR. The CFSSAR has valuable experience utilizing equipment and techniques that may have applications for the BLM smokejumper program. The BLM can maximize its research and development efforts and minimize missteps by taking advantage of lessons already learned by the Canadians.